Research report

Flow performance testing of vapour recovery systems on petroleum road tankers

energy institute

RESEARCH REPORT: FLOW PERFORMANCE TESTING OF VAPOUR RECOVERY SYSTEMS ON PETROLEUM ROAD TANKERS

First edition

April 2017

Published by
Energy Institute, London
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Registered charity number 1097899

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The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies

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Valero
Vattenfall
Vitol Energy
Woodside
World Fuel Services

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ISBN 978 0 85293 830 0

Published by the Energy Institute

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FOREWORD

The VOC (Vapour Recovery) Directive lays down technical requirements for the design of road tankers with respect to loading rates versus the flow capacity of their vapour manifold which returns the displaced vapour to a terminal's vapour recovery unit.

Road tankers are required by the directive to display a plate giving the maximum number of compartments that may be filled simultaneously without any vapour being expelled to atmosphere (as a result of excessive back pressure being generated); however, no test procedure or protocol to determine that number is defined.

Some designs of tanker have been tested in accordance with the procedure contained in the Energy Institute (EI) publication *Testing of vapour containment on petroleum road tankers*, but now other designs of tanker are being imported for which there is no evidence to support the value of the number of loading arms being stamped on the tanker plate.

This research aimed to undertake a technical assessment, to produce a flow analysis to simulate the flow of petrol vapour during loading. The aim was to determine if there could be some simple guidelines prepared that would allow the number of arms permitted to load a tanker simultaneously to be determined from visual inspection and/or drawing analysis rather than by performing physical tests every time. The findings will also feed into the EI guidance *Petroleum road tanker design and construction.*

ACKNOWLEDGEMENTS

This research report was prepared at the request of the EI's Road Tanker Technical Committee by Christopher Greenslade of Emco Wheaton. It was reviewed and input provided by the members of the Road Tanker Panel.

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1 INTRODUCTION

During 2015 the Energy Institute (EI) commissioned Emco Wheaton to carry out flow performance tests on the vapour recovery systems of a number of semi-trailer tanks of different design and manufacture, with a view to determining if there could be some simple guidelines prepared that would allow the number of arms permitted to load a tanker simultaneously to be determined from visual inspection and/or drawing analysis rather than by testing.

The testing was to be carried out following the procedures laid out in the EI publication – *Testing of vapour containment on petroleum road tankers* 2001 and Technical Report CEN/TR 15120:2013 annex B.

In essence, the flow performance test uses large flowing volumes of air to simulate the flow of petrol vapour during loading. Flow meters and pressure gauges are used to control and monitor the flows of air into each tank compartment being tested and pressure therein.

This report is a summary of the results arising from the test carried out during week commencing 26 October 2015 at the Emco Wheaton, Margate, UK site where the test equipment was located.